

AMENDMENTS TO THE DRAWINGS

The applicant submits a Replacement Sheet numbered 4 of 8. The Replacement Sheet is attached as Exhibit 1 to the response, and is labeled as "Replacement Sheet" in its top margin.

REMARKS

In the Response the Applicant amends claims 1-9, 19, and 21-22; cancels claims 12 and 14-16; and adds new claims 23-31. No new matter was added. Accordingly, claims 1-11 and 19-31 are pending in the application. The application thereby has 2 independent claims and 26 dependent claims, which is fewer than the claims for which applicant has previously paid. Accordingly, no additional claim fee is due.

A. Information Disclosure Statement

In Paragraph 3 of the Office Action, the Examiner requests that the applicant submit a proper IDS, which will be filed during the period of response.

B. Objections to the Specification

1. In paragraph 4 of the Office Action, the Examiner requests a more descriptive title for the application. In response, the Applicant has amended the title to read:

On-Chip Debugging System With Shared Data Path and Sustained Evidence.

2. In Paragraph 5 of the Office Action, the Examiner asks that the Applicant corrects any errors in the application. Accordingly, the applicant provides replacement paragraphs in the section entitled 'Amendments to the Specification'. Each numbered paragraph replaces a like-numbered paragraph from the application as published.

3. In Paragraph 6 of the Office Action, the Examiner asks the applicant to submit a replacement paragraph for updating the reference to the provisional application. Accordingly, the applicant provides a replacement paragraph [0001] in the section entitled 'Amendments to the Specification'.

C. Objections to the Drawings

In Paragraph 7 of the Office Action, the Examiner objects to Figure 4 as filed. In response, the applicant submits a Replacement Sheet having a clearer version of Figure 4.

D. Claim Objections

1. In Paragraph 8 of the Office Action, the Examiner objects to the claims for inconsistent use of dashes, in particular to fast-response and low-level. The applicant has amended the claims to consistently hyphenate "fast-response", and the phrase "low-level" is not present in the claims as amended.

2. In Paragraph 9 of the Office Action, the Examiner objects to claim 1 for a grammatical error. The applicant has removed the identified error from claim 1.

3. In Paragraph 10 of the Office Action, the Examiner objects to claim 2 for a grammatical error. The applicant has removed the identified error from claim 2.

4. In Paragraph 11 of the Office Action, the Examiner objects to claim 3 for a grammatical error. The applicant has removed the identified error from claim 3.

5. In Paragraph 12 of the Office Action, the Examiner objects to claim 12 for a grammatical error. The applicant has cancelled claim 12, so this objection is mooted.

6. In Paragraph 13 of the Office Action, the Examiner objects to claim 14 for grammatical errors. The applicant has cancelled claim 14, so this objection is mooted.

7. In Paragraph 14 of the Office Action, the Examiner objects to claim 16 for a grammatical error. The applicant has cancelled claim 16, so this objection is mooted.

E. Claim Rejections Under 35 USC §112

1. In Paragraphs 15-17 of the Office Action, the Examiner rejects claims 1-3 under 35 USC §112, second paragraph, as being indefinite. The Applicant has amended independent claim 1 to remove the reference to "major", and has amended claims 2 and 3 to depend from amended claim 1. Accordingly, the Applicant believes claims 1-3 are definite under 35 USC §112.

2. In Paragraph 18 of the Office Action, the Examiner rejects claim 7 under 35 USC §112, second paragraph, as being indefinite for having an insufficient antecedent basis. The applicant has amended claim 1, from which claim 7 depends, to expressly cite “a data path.” Accordingly, the Applicant believes claim 7 is definite under 35 USC §112.

3. In Paragraph 19 of the Office Action, the Examiner rejects claim 12 under 35 USC §112, second paragraph, as being indefinite for having an insufficient antecedent basis. The applicant has cancelled claim 12, so this rejection is mooted.

4. In Paragraph 20 of the Office Action, the Examiner rejects claim 4-11 under 35 USC §112, second paragraph, as being indefinite due to their dependency on allegedly indefinite claims. Claims 4-11 all depend directly or indirectly from claim 1, which is now believed to be definite. Accordingly, the Applicant believes claims 4-11 are definite under 35 USC §112.

F. Claim Rejections Under 35 USC §102

1. In Paragraphs 21-22 of the Office Action, the Examiner rejects claims 1-12, 14-16, and 19-22 under 35 USC 102(b) as being anticipated by US Patent No. 5,740,449. (“Densham”).

a. The pending claims. The claims as pending have two independent claims, numbers 1 and 19. All other pending claims depend either directly or indirectly from the independent claims. The applicant respectfully submits that the Examiner can not find all the claimed limitations in Densham, and therefore, Densham cannot anticipate the claimed invention. For example, both independent claims 1 and 19 cite a limitation of having a “fast-response circuit configurable to extract sustained evidence data...”. The applicant respectfully submits that Densham has no such structure and is incapable of providing sustained evidence. Instead, Densham merely discloses the collection of a very limited number of small chunks of data. Importantly, Densham constrains both the

number and size of these chunks. Therefore Densham does not and can not provide the robust and valuable sustained evidence data collection provided by the claimed invention.

b. The claimed invention recites extraction and transfer of sustained evidence data that has large bandwidth while the program executes normally. The instant invention clearly describes and provides the structure to extract and transfer sustained data and then in some cases, transfer that sustained data to an evidence file.

The structure and utility of extracting a sustained or streaming data set is set forth in the application as published in at least the following paragraphs.

[0166] The reporter also may provide pre-defined sustained instruction-oriented reporter methods, such as described below. When such a reporter method is invoked, it extracts and saves evidence approximately steadily, until explicitly halted. . . .

[0047] As the reporter 33 extracts data from the reorder buffer 21, the reporter 33 sends the extracted data to an evidence buffer 19 in L2 cache. Advantageously, the reporter 33 uses the existing high-speed data bus 18 in the transfer. In this way, the reporter 33 is able to load the evidence buffer 19 with little interference to the program operating on the central processor, and at a speed sufficient to capture the desired level of data detail. . . .

[0066] {Corresponding Action} When this landmark occurs, then take the following corresponding action. First, pause execution and assign a value to the landmark flag. Second, extract and save some data as evidence. Third, resume execution and steadily extract and save a stream of data as evidence.

[0132] Suppose the operator knows a distinct and clear-cut symptom, and hence has defined a landmark. During execution, this landmark will occur after the bug has occurred. By contrast, some reporter methods are "sustained". To gather and save relevant evidence, these reporter methods are to be started before the Bug. Therefore the symptom landmark is not useful to trigger these Reporter methods. Therefore the operator may construct a precursor landmark, that occurs before the bug. This is useful to trigger sustained reporter methods. The symptom landmark is useful to terminate sustained reporter methods.

[0161] The reporter may also provide pre-defined sustained block-oriented reporter methods, such as defined below. When such an reporter method is invoked, this flushes a buffer, then copies a block from execution to evidence. This is repeated for new blocks, until this reporter method is halted. Such a reporter method includes a procedure that operates on the reporter sequential logic. This interacts with the controllers of the memory hierarchy described above. Suppose a block is transferred down in this hierarchy. Almost simultaneously, the reporter method procedure uses these controllers, to transfer also a copy into evidence at a similar or lower level. Examples of such reporter methods follow.

[0176] {Halt} Halt operation of pre-defined sustained reporter method.

[0187] The preparation software may also assist the operator to specify how to extract and save evidence with the reporter. The preparation software provides a list of landmarks, and the operator chooses among these. The preparation software provides a list of pre-defined reporter methods, and the operator may choose one or more. For each sustained reporter method that is chosen, then this operator provides a list of criteria to halt its operation, . . .

Accordingly, the specification sets out the structures, processes, and advantages of providing sustained evidence data.

c. Denham does not provide for any extraction of sustained data.. Instead, Denham merely teaches a method and apparatus to generate an interrupt signal which indicates the occurrence of one of a plurality of predetermined events, and to record a limited and discreet amount data describing this event. For each such an event, Denham records data that consists of one or a few addresses. As illustrated in the excerpts below, Denham only teaches the extraction of a very limited set of data.

At column 10, lines 6-13, Denham describes that a simple interrupt test generates an interrupt signal:

. . . . Thus, an interrupt test instruction will result in generation of an interrupt signal by the SPIC when the data values read by the instruction from the two specified data locations are not equal. For this reason, the interrupt test instruction is termed an "interrupt-if-not-equal instruction" (INE instruction) and will be referred to hereinafter as such.

At column 11, lines 2-17, Densham describes that the interrupt signal is used to generate a limited amount of the interrupt data:

... The ALU 13, under control of the instruction data on the control line 30, subtracts the data at location B from the data at location A and supplies the resulting "interrupt data" to the output 38. The interrupt data, i.e. the result of the subtraction, is supplied, via the multiplexer 14, to the data ram 7c and written to location C. As the interrupt data is supplied to the output 38 of the ALU 13, the state of the output 39 is set according to whether the data supplied to the input 35 from location A is equal to data supplied to the input 37 from location B. If the data values are equal, i.e. $data_A - data_B = 0$, the output 39 is set to logic 1, so that, after negation, logic 0 is input to the AND gate 40. However, if $data_A - data_B \neq 0$, logic 1 is input to the AND gate 40. If, at the same time, the INE identification bit on control branch 42 is set, indicating that the instruction is an INE instruction, then an interrupt signal will be generated on the interrupt output 43.

At column 11, lines 37-60, Densham describes using the interrupt data, which is described as a very limited and discreet data set:

As described above, the interrupt data produced by the INE instruction, i.e. the result of subtracting the data at locations A and B, is written to location C. It will be noted that this data identifies whether an interrupt signal has been generated. This is because the interrupt data will be zero under normal circumstances ($data_A = data_B$), and non-zero only when an interrupt signal is generated ($data_A \neq data_B$). The addresses of the data locations C associated with all INE instructions in a given SPIC are stored in the control processor 26 on set-up. These addresses may be stored in the form of a look-up table, e.g. in a memory of the control processor, which associates the addresses with the particular events the occurrence of which would result in generation of an interrupt signal by the corresponding INE instructions. Thus, for each event which would require generation of an interrupt signal on detection during processing by the SPIC, there is an associated INE instruction the data locations A, B of which are written to if an interrupt signal is to be generated as a result of detection of that event. The data locations C of these INE instructions are tabled in the control processor against the events corresponding to the INE instructions. This provides a particularly convenient means for identifying the source of an interrupt signal received by the control processor 26.

Accordingly, Densham does not provide any structure to record sustained data. Densham does not provide extraction or transfer of sustained evidence data. Also the structure of Densham does not and can not provide extraction or transfer sustained evidence data while the program continues to execute.

Since Densham does not disclose or have all the elements of the claimed invention, it therefore cannot anticipate independent claims 1 or 19.

2. In paragraph 23 of the Office Action, the Examiner provides further detail to the Examiner's anticipation rejection of claim 1 under Densham. For the reasons set out in Section F(1) above, the applicant respectfully submits that independent claim 1 is not anticipated by Densham.

3. In paragraph 24 of the Office Action, the Examiner provides further detail to the Examiner's anticipation rejection of claim 2 under Densham. For the reasons set out in Section F(1) above, the applicant respectfully submits that amended claim 2 is not anticipated by Densham due to its dependence from claim 1, which is believed to be in condition for allowance.

4. In paragraph 25 of the Office Action, the Examiner provides further detail to the Examiner's anticipation rejection of claim 3 under Densham. For the reasons set out in Section F(1) above, the applicant respectfully submits that amended claim 3 is not anticipated by Densham due to its dependence from claim 1, which is believed to be in condition for allowance.

5. In paragraph 26 of the Office Action, the Examiner provides further detail to the Examiner's anticipation rejection of claim 4 under Densham. For the reasons set out in Section F(1) above, the applicant respectfully submits that amended claim 4 is not anticipated by Densham due to its dependence from claim 1, which is believed to be in condition for allowance.

6. In paragraph 27 of the Office Action, the Examiner provides further detail to the Examiner's anticipation rejection of claim 5 under Densham. For the reasons set out in Section F(1) above, the applicant respectfully submits that amended claim 5 is not anticipated by Densham due to its dependence from claim 1, which is believed to be in condition for allowance.

7. In paragraph 28 of the Office Action, the Examiner provides further detail to the Examiner's anticipation rejection of claim 6 under Densham. For the reasons set out in Section F(1) above, the applicant respectfully submits that amended claim 6 is not anticipated by Densham due to its dependence from claim 1, which is believed to be in condition for allowance.

8. In paragraph 29 of the Office Action, the Examiner provides further detail to the Examiner's anticipation rejection of claim 7 under Densham. For the reasons set out in Section F(1) above, the applicant respectfully submits that amended claim 7 is not anticipated by Densham due to its dependence from claim 1, which is believed to be in condition for allowance.

9. In paragraph 30 of the Office Action, the Examiner provides further detail to the Examiner's anticipation rejection of claim 8 under Densham. For the reasons set out in Section F(1) above, the applicant respectfully submits that amended claim 8 is not anticipated by Densham due to its dependence from claim 1, which is believed to be in condition for allowance.

10. In paragraph 31 of the Office Action, the Examiner provides further detail to the Examiner's anticipation rejection of claim 9 under Densham. For the reasons set out in Section F(1) above, the applicant respectfully submits that amended claim 9 is not anticipated by Densham due to its dependence from claim 1, which is believed to be in condition for allowance.

11. In paragraph 32 of the Office Action, the Examiner provides further detail to the Examiner's anticipation rejection of claim 10 under Densham. For the reasons set out in Section F(1) above, the applicant respectfully submits that claim 10 is not anticipated by Densham due to its dependence from claims 8 or 9 and claim 1, which are believed to be in condition for allowance.

12. In paragraph 33 of the Office Action, the Examiner provides further detail to the Examiner's anticipation rejection of claim 11 under Densham. For the reasons set out in Section F(1) above, the applicant respectfully submits that claim 11 is not anticipated by Densham due to its dependence from claims 8 or 9 and claim 1, which are believed to be in condition for allowance.

13. In paragraph 34 of the Office Action, the Examiner provides further detail to the Examiner's anticipation rejection of claim 12 under Densham. The applicant has cancelled claim 12, so this rejection is mooted.

14. In paragraph 35 of the Office Action, the Examiner provides further detail to the Examiner's anticipation rejection of claim 14 under Densham. The applicant has cancelled claim 14, so this rejection is mooted.

15. In paragraph 36 of the Office Action, the Examiner provides further detail to the Examiner's anticipation rejection of claim 15 under Densham. The applicant has cancelled claim 15, so this rejection is mooted.

16. In paragraph 37 of the Office Action, the Examiner provides further detail to the Examiner's anticipation rejection of claim 16 under Densham. The applicant has cancelled claim 16, so this rejection is mooted.

17. In paragraph 38 of the Office Action, the Examiner provides further detail to the Examiner's anticipation rejection of claim 19 under Densham. . For the reasons set out in Section F(1) above, the applicant respectfully submits that independent claim 19 is not anticipated by Densham.

18. In paragraph 39 of the Office Action, the Examiner provides further detail to the Examiner's anticipation rejection of claim 20 under Densham. For the reasons set out in Section F(1) above, the applicant respectfully submits that claim 20 is not anticipated by Densham due to its dependence from claim 19, which is believed to be in condition for allowance.

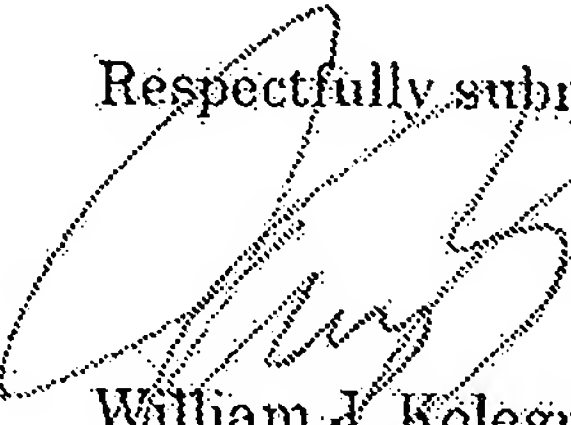
19. In paragraph 40 of the Office Action, the Examiner provides further detail to the Examiner's anticipation rejection of claim 21 under Densham. For the reasons set out in Section F(1) above, the applicant respectfully submits that amended claim 21 is not anticipated by Densham due to its dependence from claim 19, which is believed to be in condition for allowance.

20. In paragraph 41 of the Office Action, the Examiner provides further detail to the Examiner's anticipation rejection of claim 22 under Densham. For the reasons set out in Section F(1) above, the applicant respectfully submits that amended claim 22 is not anticipated by Densham due to its dependence from claim 19, which is believed to be in condition for allowance.

G. Conclusion

The applicant respectfully submits that all pending claims are in a condition for allowance. Please direct any questions or correspondence to the undersigned attorney for the applicants.

Respectfully submitted,



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EXHIBIT 1

Replacement Sheet 4 of 8 for Figure 4